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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Pacific Northwest Environmental Research Laboratory, NERC-Corvallis

SUBJECT: PCB's in Elliott Bay

DATE: April 16, 1973

FROM: Chief, National Coastal Pollution Research Program

TO:

Dr. Gary O'Neal
Director, Surveillance and Analysis Division
Region X
Seattle, WA

Confirming our telephone conversation of several weeks ago, I am enclosing a chart showing locations of samples collected by Dr. Blazeovich and results of his analysis for PCB's in Elliott Bay. The samples were taken using a research vessel of the University of Washington through the courtesy of Dr. Pavlou who is participating in our PCB research program through an extramural grant.

We will continue to analyze samples from other parts of Puget Sound and from the Duwamish Estuary to determine, if we can, the source of PCB input and ambient levels throughout the Sound. These levels, found in Elliott Bay near Harbor Island, are significant and are in many cases as high as those found in the Escambia River Estuary by Nemo, et al. Until the distribution of PCB's is better defined in this area, and the fate of PCB's from dredge spoils more accurately defined, these results would indicate that EPA should express objections to Corps of Engineers' dredging activities in Harbor Island.



D. J. Baumgartner

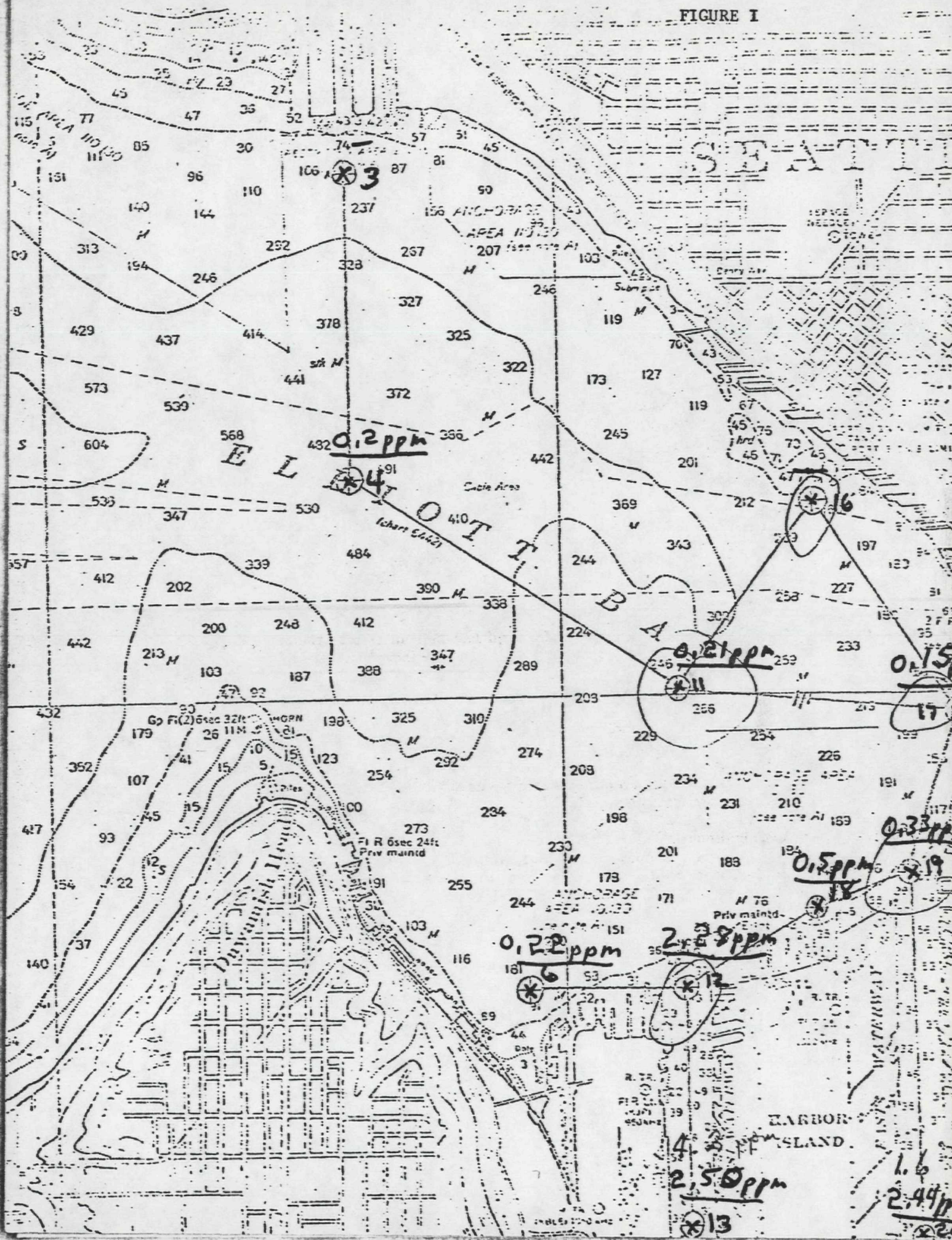
Enclosure

cc: Director, PNERL

503-752-4367 or 8



FIGURE 1



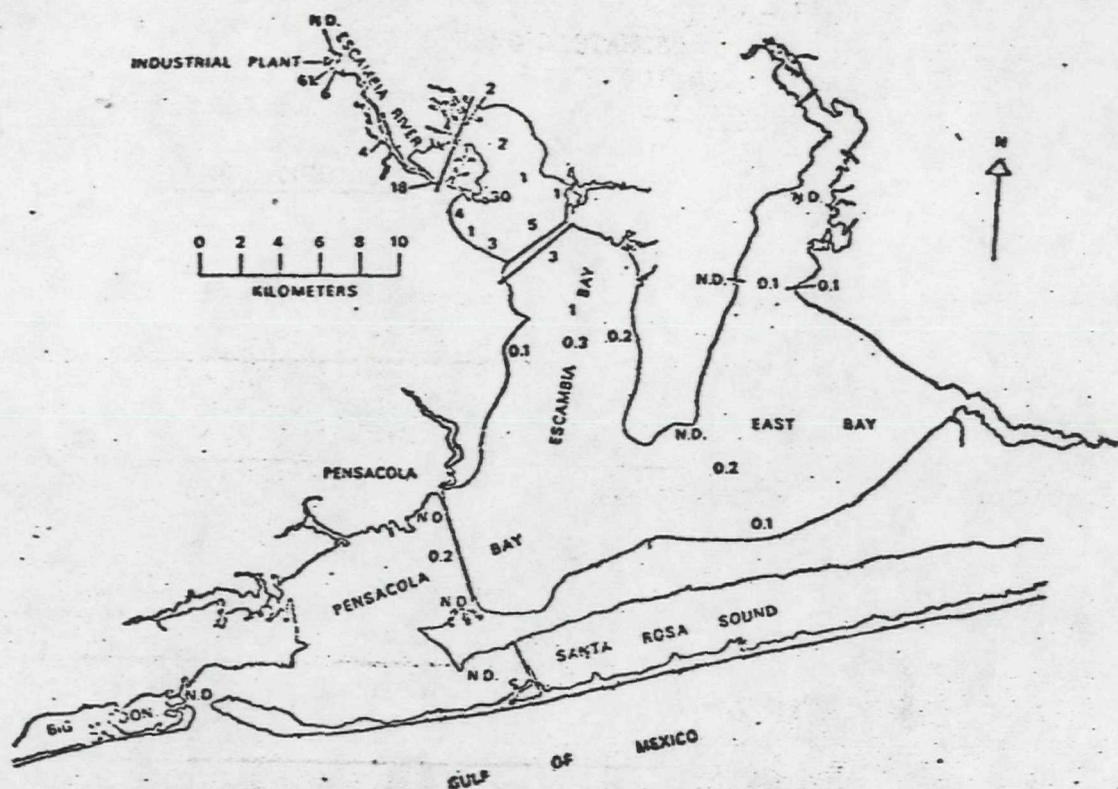


Fig. 2. Residues of Aroclor 1254 (in ppm) found in sediments from Escambia Bay and contiguous waters during 1969/70. N.D.: less than 0.03 ppm

insoluble in water, but soluble in lipid and lipid solvents. In addition to their thermal stability they are also resistant to acid and base, and therefore, persist in the environment.

PCBs are toxic to trout and blue gill (spp. not given) — GUSTAFSON, 1970; shrimp (*Penaeus duorarum*) and oysters (*Crassostrea virginica*) — DUKE et al., 1970; and a fish (*Lagodon rhomboides*) — HANSEN et al., 1971. Also, a PCB used as a binder in epoxy paint was toxic to chickens (GUSTAFSON, 1970). Abnormally thin-shelled eggs of birds in Great Britain and North America were associated with residues of chlorinated hydrocarbons including the PCBs (RISEBROUGH et al., 1968). In 1969, a PCB (Aroclor 1254) was discovered as a contaminant in water, sediment and fauna of Escambia Bay, Florida (DUKE et al., 1970). One source of this material was traced to an accidental leak in a heat-exchange system of an industrial plant located several kilometers upstream in Escambia River. It is now present in estuarine organisms, including shrimp captured from Escambia Bay and contiguous waters (Fig. 1). Sediments from the river and upper bay appear to be a reservoir for the compound (Fig. 2). In earlier experiments, shrimp exposed to these sediments for 30 days accumulated the chemical (NIMMO et al., 1971). In this paper we report toxicity of Aroclor 1254 in water, rates of accumulation from food and water,

and distribution of this PCB in the organs of the shrimp *Penaeus duorarum*.

Materials and methods

Shrimp for laboratory studies were obtained from two sources. Juvenile (2.5 to 3.8 cm) pink shrimp (*Penaeus duorarum*) were collected with a small net from Santa Rosa Sound at Pensacola Beach, Florida in June through September. Adult pink shrimp from Tampa, Florida, were purchased from a live-dealer. Background concentrations of chlorinated hydrocarbon compounds in the hepatopancreases of shrimp never exceeded 0.6 parts per million (ppm). Whole-body residues were less than 0.01 ppm.

All shrimp were acclimated in flowing sea water for several days in the laboratory. Juveniles fed detritus carried in by the flowing unfiltered sea water and adults were fed mullet (*Mugil cephalus*) not containing less than 0.03 ppm organochlorine compounds each day. Beach sand with no detectable organochlorine compounds was provided as a substrate for the shrimp.

Shrimp were exposed to Aroclor 1254 (here called Aroclor) in flowing-water systems. The Aroclor was dissolved in polyethylene glycol 200, infused into the flowing water with syringe pumps, then mi-

TABLE 1

Results Of Analysis For PCB

<u>Station</u>	<u>[PCB] in ppm dry wt.</u>
4	0.20
6	0.22
11	0.21
12	2.28
13	2.50
17	0.15
18	0.50
19	0.33
20	2.44